CHANGES IN THE RELATIVE INCENTIVES TO INVEST IN HOUSING: AUSTRALIA, SWEDEN, AND THE UNITED STATES

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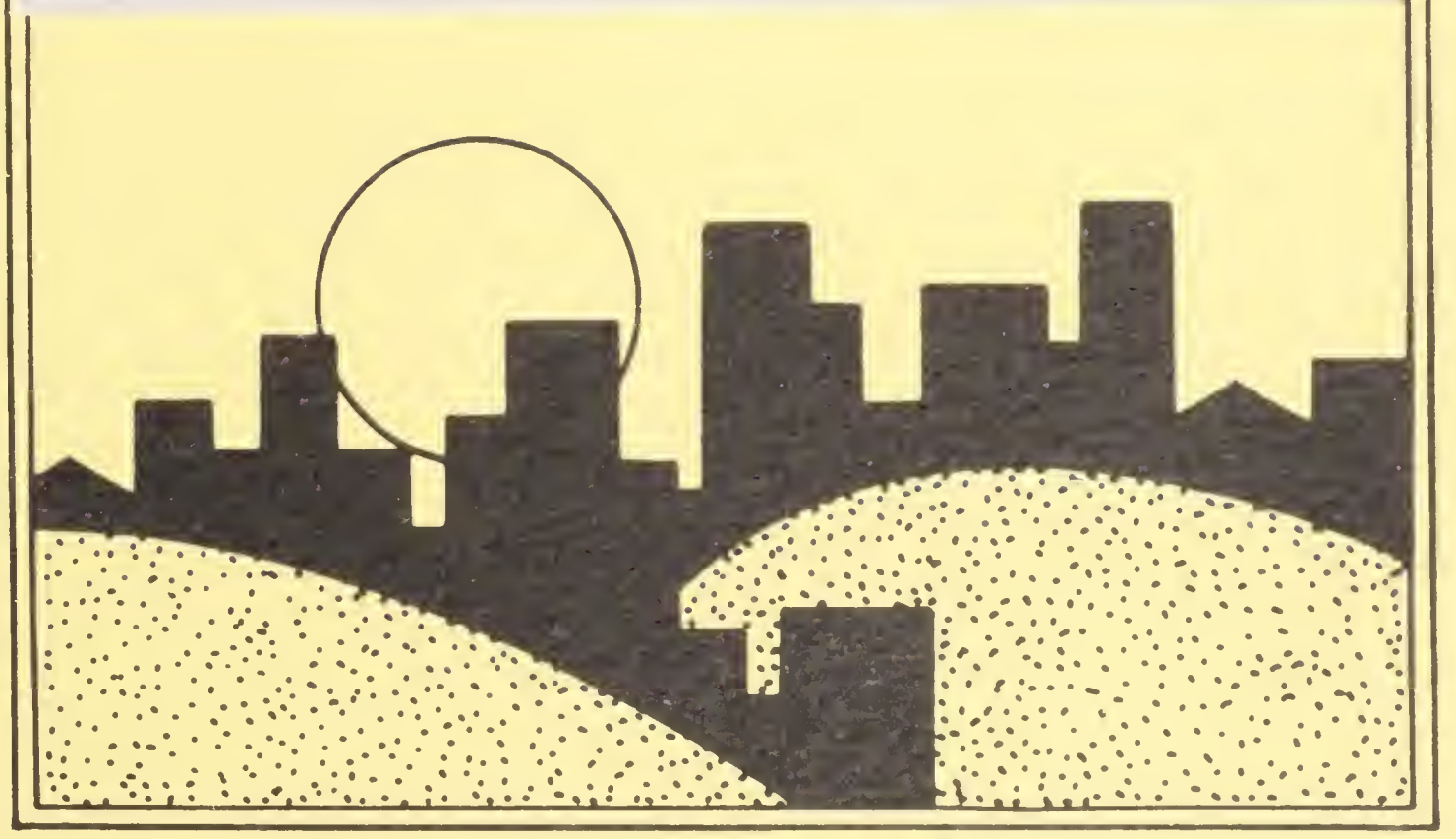

URBAN RESEARCH PROGRAM

RESEARCH SCHOOL OF SOCIAL SCIENCES

AUSTRALIAN NATIONAL UNIVERSITY

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ABSTRACT

Tax restructuring occurred in many countries during the 1980s. These restructurings generally involved reductions in special tax incentives and subsidies and cuts in marginal income tax rates. This paper analyzes the tax and subsidy changes in three countries: Australia, Sweden, and the United States. It focuses on the relative incentives to invest in business and housing capital, but also looks at implications for international competitiveness.

The paper begins by addressing an important methodological question concerning the merits of effective tax rates versus user costs as statistics for analyzing the efficiency of capital allocation. We argue that user costs are preferable because effective tax rates depend on how the saver is taxed, even though the investor is concerned only with the pre-tax return he must pay to the saver. In other words, effective tax rates take into account factors irrelevant to the investor's capital allocation decision. We then outline our user cost methodology, discuss the values for the parameters used in the equations, and report the results of our calculations.

In reporting our results, we address two questions. First, did the tax and subsidy changes in the various countries increase or decrease the efficiency of the allocation of capital among business uses and housing and within the housing stock? Second, did the changes alter the incentives for business investment across countries, i.e., alter the international competitiveness of the countries?

In regard to the first question, we conclude that Sweden and the United States greatly narrowed the range of user costs for owner-occupied housing across the income spectrum, providing incentives for a more efficient allocation of the existing housing stock. In contrast, incentives for substantial inefficiencies in the allocation of Australia's owner-occupied housing stock remain, owing to both a quite progressive personal tax rate schedule and the non-deductibility of home mortgage interest. The United States lowered owner-occupied housing costs of capital even further relative to those of business capital, reducing the overall efficiency of the total capital stock, while Australia did the reverse.

Comparing the three countries, Australia went from the country with the highest corporate costs of capital to that with the lowest. Sweden, in contrast, went from the country with the lowest costs of capital to that with nearly the highest. Corporate costs in the United States increased, but by smaller amounts than did those in Sweden. From an international competitiveness perspective, Australia gained and Sweden lost.

Changes in the Relative Incentives to Invest in Housing: Australia, Sweden, and the United States*

Patric H. Hendershott† and Steven C. Bourassa††

Tax restructuring occurred in many countries during the 1980s. These restructurings generally involved reductions in special tax incentives and subsidies and cuts in marginal income tax rates. This paper analyzes the tax and subsidy changes in three countries: Australia, Sweden, and the United States. We focus on the relative incentives to invest in business and housing capital. We address two questions. First, did the tax and subsidy changes in the various countries increase or decrease the efficiency of the allocation of capital among business uses and housing and within the housing stock? Second, did the changes alter the incentives for business investment across countries, i.e., alter the international competitiveness of the countries? The paper is divided into three sections and a conclusion. We begin with a short discussion of why rental user costs are better statistics for measuring investment incentives than are real effective tax rates. Section II presents and describes the equations for computing user costs, and Section III reports the results.

I. Effective Tax Rates or User Costs?

Two sets of statistics have been used to analyze the efficiency of the allocation of capital: real effective tax rates and net rental user costs. The real effective tax rate on an asset is the ratio of total (borrower and lender) taxes paid on a dollar of capital to the pre-tax real return on the asset (p). Taxes paid, in turn,

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are defined as the difference between the pre-tax real return and the after-tax real rate of return paid to the saver or supplier of the capital (s), Thus the effective tax rate, t*, is (p - s)/p. These rates can be computed on an average or marginal basis (Fullerton, 1984). Assets with lower marginal effective tax rates are said to be tax favoured.

The second set of statistics are rental user costs defined as the annual rental rate a capital user would have to pay to use an additional dollar of capital (see the next section for a detailed discussion). This measure takes into account all the tax benefits received and costs paid by the purchaser and the pre-tax real return paid to the saver or supplier of capital. The lower the user cost, the more tax-favoured the asset.

The principal difference in these statistics is the treatment of the supplier of funds. Effective tax rates depend on how the saver is taxed, while user costs do not. Because an investor doesn't care how the supplier of funds is taxed (the investor is concerned only with the pre-tax return he must pay), user costs are the appropriate statistics to use in studies of capital allocation, and effective tax rates can be misleading.

To illustrate this point, consider the case of owner-occupied housing in the U.S. Because home mortgage interest is tax deductible, the tax advantage of owner-occupied housing (the non-taxation of imputed rental income from the house and the low taxation of capital gains) is available to homeowners whether they debt or equity finance their house, and the user cost will be independent of the financing form. The effective tax rate, on the other hand, will differ by financing form if home-owners deduct interest paid at a different tax rate than that at which lenders (savers) pay on interest received.

For example, if households deduct interest at a higher rate than savers pay, then $p < s$ and $t^* < 0$ for debt finance. For equity finance, $p = s$, so $t^* = 0$. That is, debt financing will appear to be tax favoured when, in fact, households are indifferent to the financing form.

II. Measuring User Costs (Investment Hurdle Rates)

This section contains three parts. We begin with a detailed discussion of user costs, then consider special complications of owner-occupied housing, and close with an analysis of the housing finance subsidies for construction in Sweden.

General Considerations[1]

As is well known, the decision to invest depends on whether the present value of the expected revenue from investment exceeds the supply price of capital, and on marginal investments the two will be equal. After allowance for taxation, the equilibrium condition for investment is

$$\rho = \frac{(r + d)(1 - k - \tau z) + (1 - \tau) w}{1 - \tau}, \qquad (1)$$

where ρ is the gross marginal product of capital, r is the real after-tax financing rate, d is the economic depreciation rate, τ is the business tax rate, k is the investment tax credit, and w is the property tax rate. In general, z is the present value of the stream of tax depreciation allowances, $TAXDEP_t$, obtained by discounting the stream by the nominal risk-free rate, taking into account the reduction in depreciable basis if the investment tax credit is claimed:

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1 This section draws heavily on Hendershott (1987).

$$z = (1 - kB)\sum_{t=1}^{N} \frac{TAXDEP_t}{[(1 + r)(1 + \pi)]^t}, \qquad (2)$$

where π is the expected inflation rate, B is the fraction of the tax credit by which the basis is reduced, and N is the depreciation life of the asset. The right side of equation (1) is the "investment hurdle rate" or rental user cost for a particular asset. The lower the user cost, the greater will be production of the asset, and the lower will be the productivity of the marginal investment (ρ).

In a "neutral" tax system, the net user and thus net marginal productivities (ρ - d) would be the same for all equally-risky assets. This can be achieved in a variety of ways. For example, with no investment tax credit (k = 0) and either expensing (z = 1) or non-taxation (τ = 0), then ρ - d = r + w. If the r's were equal for all assets, the tax system would be neutral across them. Alternatively, with no investment tax credit and tax depreciation equal to economic depreciation [z = d/(r + d)], then ρ - d = [r/(1 - r)] + w. If the r's and the τ's were the same for all assets, then the system would also be neutral. If τ is zero for some assets, e.g., owner-occupied housing, then neutrality for taxed assets requires setting k + τz = τ (one combination of which is no investment tax credit and expensing).

Assuming that firms use a fixed fraction of debt, b, for financing investments at interest rate i, which is tax deductible, the real after-tax financing rate can be expressed as

$$r = [b(1 - \tau)i + (1 - b)[(e - g) + (1 - \gamma\tau)g] - \pi]/(1 + \pi), \qquad (3)$$

where e is the required nominal return to equity investors, g is the part of the

return that is expected to be paid as a capital gain, and γ is the fraction of the gains portion that is deductible at the business level (none of the non-gains portion is deductible). Firms will choose the b at which the marginal costs of debt and equity, including contracting and bankruptcy costs, are equal. (Because these marginal costs are unknown, average values of b, i and e are used in the calculation of r.)

Portfolio equilibrium of investors requires that after-tax equity returns equal the after-tax risk-free rate plus a risk premium:

$$(1 - \tau_e)e = (1 - \tau_i)i + \delta/(1 - b), \tag{4}$$

where τ_e is the rate at which equity returns are taxed at the personal level, τ_i is the rate at which interest received by these investors is taxed, and δ is the risk premium required on unlevered investments. Substituting (4) into (3), the real after-tax financing rate for capital other than owner-occupied housing is:

$$r = \left[b(1 - \tau)i + (1 - b)\left[\frac{(1 - \tau_i)i + \delta/(1 - b)}{1 - \tau_e} - \gamma\tau g\right] - \pi\right]/(1 + \pi). \tag{3'}$$

If equity returns were taxable at only the firm level ($\tau_e = 0$), none of the gains component was deductible ($\gamma = 0$), and interest was deductible at the rate at which it is taxed ($\tau_i = \tau$), then r would equal $[(1 - \tau)i - \pi + \delta]/(1 + \pi)$ for all assets.

For corporations, τ is the corporate income tax rate, none of capital gains are deductible at the firm level ($\gamma = 0$), and the taxation of income at the personal level depends on the taxation of dividends and capital gains. In general

$$\tau_e = n\tau_{div} + (1 - n)\tau_{cg}, \tag{5}$$

where τ_{div} and τ_{cg}, respectively, are the effective tax rates on dividends and equity capital gains. The weight n applied to the dividend tax rate depends on either the proportion of equity funds raised by new issues rather than retained earnings (the new view) or the proportion of income paid out rather than retained (the old view).[2]

For non-corporate business, τ_e equals $(g/e)\tau_{cg}$ or $(1 - \tau_e)e = e - g\tau_{cg}$. Using equations (3) and (4) and assuming $\gamma = 1$, equation (3') can be simplified to

$$r = [(1 - \tau)i + \delta - (1 - b)(\tau - \tau_{cg})g - \pi]/(1 + \pi). \qquad (3'')$$

Owner-Occupied Housing

For owner-occupied housing, there is no tax credit or tax depreciation, and the returns (net rents not paid) are not taxed.[3] Thus, equality between the net marginal product and the net user cost gives $\rho - d = r + (1 - \tau)w$ in the U.S. In Sweden and Australia, property taxes are not deductible for households, so $\rho - d = r + w$. Moreover, the gains component is neither deductible nor, generally, taxed, and the r's differ across households because the tax rates at which interest and property taxes are deductible (and at which equity the owner has in the house would have been taxed had the household rented) vary across households. Thus, the real after-tax financing rate for the j^{th} household in Sweden and the United States is

$$r_j = [(1 - \tau_j)i + \delta - \pi]/(1 + \pi). \qquad (6)$$

For Australia, where interest isn't deductible,

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2 See Fullerton, Gillette, and Mackie (1987) on this point.

3 Until the Swedish 1991 tax reform, imputed income equal to 0.013 of house value was included in taxable income. We include this in our estimate of property taxes.

$$r_j^{AU} = [(1 - b)(1 - \tau_j)i + bi + \delta - \pi]/(1 + \pi). \quad (7)$$

In the latter case, the financing rate also varies with the tangible wealth of the household, which affects the value of b.

Another complication is the existence of interest rate subsidies. Some households receive subsidies in Australia and the United States, but the subsidies are neither widespread nor particularly targeted to new construction.[4] Sweden is another matter. Subsidies have existed for all new construction for many years, and builder profits are sufficiently regulated that much of the subsidy is likely passed through to home buyers, lowering the investment hurdle rate.

With subsidies (and no deductibility of property taxes), equation (1) for owner-occupied housing becomes

$$\rho_j = (r_j + d)(1 - bPVSUB) + w, \quad (1')$$

where PVSUB is the present value of the subsidy per unit loan. For rental housing, which also receives interest rate subsidies, we simply replace k in equation (1) with bPVSUB.

Swedish Housing Subsidies[5]

Since 1975, the Swedish housing finance system for new construction has been based upon relatively large interest rate subsidies. During the 1980s, the volume of aggregate governmental interest-subsidy outlays more than doubled

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4 Bourassa and Hendershott (1992) provide estimates of possible effects of the Australian First Home Owner Scheme subsidies available in 1984-85.

5 This section is based on Hendershott and Waller (1992).

in real terms, exceeding 1.5 percent of GNP in 1989 (interest tax deductions constituted another 1.5 percent). In December 1990, the Swedish Riksdag adopted a new system for financing and subsidizing housing as part of a broad tax reform effort. The new system is scheduled to be introduced on 1 January 1992 (it may be modified by the new government installed in September) and has as its key components a sharp reduction in nominal interest rate subsidies, a new "indexed" loan scheme, and a new real interest-rate subsidy.

Under the pre-1991 system, the borrower pays a governmentally-determined "guaranteed" interest rate each year on the initial loan amount, and the government pays the remainder of the interest cost. For new construction, the initial guaranteed interest rate in 1989 was 4.9% for owner-occupied housing and 2.9% for rental housing. The guaranteed interest rate is raised every year of the loan life by one-half percent for owner-occupied and one-quarter percent for rental, until this rate reaches the product of the actual contract interest rate and the fraction of the initial loan remaining, at which time the interest subsidy is zero. The subsidized interest rate is lower for rental than for owner-occupied to offset the more favourable tax treatment of owner-occupied housing.

Under the new rules, landlords receive a basic 30 percent subsidy of interest costs over a 40 year loan life.[6] In addition, both owners and renters will receive a subsidy when real interest rates are unusually high. The subsidy is based on the "full real interest subsidy" rate, the maturity of the loan, and the total outstanding loan balance. When real interest rates are sufficiently high, the full real interest subsidy rate is calculated as

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6 The new subsidy rules have not yet been adopted and, with the change in government in November 1991, may never be.

$$sub_t = 0.7[averint_{t-1} - (\pi_{t-1} + .03)/.85], \tag{8}$$

where "averint" is a weighted average of the interest rates on the mortgage loans held by the lending institution. When real rates are so low that this calculation is negative, the full subsidy rate equals zero. In effect the full subsidy is roughly three-quarters of real interest rates in excess of about 4 percent. The full real interest subsidy rate will be paid (when real rates are sufficiently high) in the first 10 years of the loan. During the succeeding 10 years, the real interest subsidy rate is decreased by 1/10 of the full subsidy rate each year. This rate is applied to the total outstanding debt. Under 1982 law, the present value of the subsidy for owning household j is

$$PVSUB_j^O = \sum_{t=1}^{N} \frac{(if_{t-1} - g_{t-1})(1 - \tau_j)}{[1 + (1 - \tau_j)i]^t}, \tag{9}$$

where f_{t-1} is the fraction of the initial loan still outstanding in period t - 1, and g_{t-1} is the lesser of the guaranteed owner interest rate in period t - 1 and $(1 - \tau_j)if_{t-1}$. For renters, g_{t-1} takes on different values and is not multiplied by $1 - \tau_j$ because this interest is not deductible.

In the new system,

$$PVSUB_j^N = \sum_{t=1}^{N} \frac{(1 - \tau_j)sub_t f_{t-1}}{[1 + (1-\tau_j)i]^t} + \sum_{t=1}^{N} \frac{\tau_j i f_{t-1}}{[1 + (1 - \tau_j)i]^t}, \tag{10}$$

where the second summation exists for renters only.

III. Relative Investment Incentives

This section is divided into five parts. We start with a general presentation of the tax and other parameters used in the calculations for the three countries. We then report the results for each of the countries and close with a brief comparison across countries.

Parameter Values

Table 1 lists the tax depreciation and credit parameters in the three countries, both when widespread business incentives were in effect (1982 in Sweden and the U.S. and 1985 for Australia) and after the recent tax reforms. An incentive peculiar to the U.S., especially in the early 1980s, was the sale and "redepreciation" of real estate properties (in neither Australia nor Sweden can used properties be depreciated). To incorporate this phenomenon, we multiply z for commercial and residential properties by 1.16, based upon the computations of Follain, Hendershott and Ling (1987).[7] The tax reforms removed investment tax credits in all countries, generally lengthened the period over which depreciation could be taken, and eliminated the tax advantage of redepreciating properties in the U.S.

Table 2 contains tax rates for the three countries pre- and post-reform. We begin with the U.S. rates because they are easiest to explain. The corporate tax rate reflects federal, state and local taxes (Fullerton, Gillette, and Mackie, 1987, p. 141). The tax rates on dividends and rents of real estate (non-corporate) investors are weighted-average marginal tax rates, including state and local government taxes, of all investors (financial institutions as well as in-

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7 For 1981, 1.16 equals the ratio of the present value of tax saving owing to tax depreciation with multiple trades (.291) to the present value with a single trade (.251).

Table 1
Depreciation and Tax Credit Parameters

	Equipment	Industrial	Commercial	Residential
Economic Depr.	.10	.026	.018	.023
Australia				
1985				
Type Depr.	SL	SL	SL	none
Tax Life	5	25	25	NA
Tax Credit	$.18\tau^a$	0	0	0
1991				
Type Depr.	SL	SL	SL	SL
Tax Life	9.2	40	40	40
Tax Credit	0	0	0	0
Sweden				
1982				
Type Depr.	EXP(.3)	SL+[b]	SL+[b]	SL+[b]
Tax Life	NA	28	36	33
Tax Credit	.114	.057	.057	.057
1991				
Type Depr.	EXP(.3)	SL	SL	SL
Tax Life	NA	28	36	33
Tax Credit	0	0	0	0
United States[c]				
1982				
Type Depr.	1.5SL	1.75SL	SL	1.75SL
Tax Life	5	15	15	15
Tax Credit	.10	0	0	0
1991				
Type Depr.	2.0SL	SL	SL	SL
Tax Life	7	31.5	31.5	27.5
Tax Credit	0	0	0	0

SL = straight line; EXP = exponential.

a. The Australian 18 percent credit was deductible against taxable income, not against taxes. Thus the 0.18 was worth 0.18τ, where τ is the tax rate (0.46 is used).

b. SL + .02 for the first five years, then SL.

c. In the U.S., investors can switch from accelerated to SL depreciation when it becomes profitable for them to do so.

dividuals) and also are from Fullerton, Gillette and Mackie (1987, Table 5.3). These rates reflect the full implementation of the 1981 Tax Act. The tax rate at which interest received by these investors is taxed (used in our equation 4) is presumably the same as the tax rate on dividends or rents. Interest paid by non-corporate firms is deducted at the same rate.

Table 2

Tax, Interest and Inflation Rates

	Australia		Sweden		United States	
	1985	1991	1982	1991	1982	1990
Corporate Tax Rate	.46	.39	.343	.30	.495	.383
Corporate Equity Investors						
Dividends	.22	-.03	.316	.187	.285	.232
Interest	.22	.35	.366	.187	.285	.232
Capital Gains*	.00	.05	.20	.50	.20	.50
Real Estate Investors						
Rents	.30	.40	.50	.30	.30	.26
Capital Gains*	.00	.05	.20	.50	.20	.50
Property Tax Rates						
Business Capital	.006	.006	.017	.017	.018	.018
Owner-Occupied Housing	.006	.006	.023	.005	.012	.012
Interest Rate	.13	.13	.16	.11	.13	.07
Inflation Rate	.07	.07	.10	.07	.08	.04

* This is the fraction the concurrent effective rate is assumed to be of the appropriate regular tax rate, as applied to nominal capital gains.

The percentage of regular income tax rate applied to capital gains is 0.5 in the early 1990s, to reflect deferral, and 0.2 in the early 1980s, which also reflects

the then existing 60 percent exclusion. The gains part of non-corporate income is set equal to $0.5(\pi - d)/(1 - b)$. The multiplication by one-half assumes that half of the inflation-generated component of expected returns takes the form of rising rents over time and is taxed at the regular tax rate and half takes the form of rising sales price (relative to basis) and is taxed at the capital gains rate.[8]

The same general procedure is used for Australia (see Appendix A), with three exceptions. First, capital gains were not taxed in the early 1980s and only real gains have been taxed since late 1985. Because real gains have to be low, on average, we assume that the percentage of the regular tax rate applied to concurrent nominal gains is only 0.05. Second, Australia introduced dividend relief in the late 1980s to offset the double taxation of dividends. In effect, dividends are taxed once at the personal tax rate. Because the average tax rate of investors in corporate equities (which includes pensions taxed at only the 15% rate) is less than the corporate tax rate, the dividend tax rate is negative. Third, rates on home mortgages (ARMs) in Australia have consistently been below rates on three-month Treasury notes rather than above them, as we would expect.[9] To compensate for these low rates, we subtract 0.015 from the i value in the second term in the brackets of equation 7.

Sweden, too, has some exceptions. First, in 1982 the statutory corporate tax rate was 57%, but the investment funds system lowered the effective rate, at 10 percent inflation rate, to 0.343 (Södersten and Lindberg, 1984, pp. 54-6).

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8 This assumption is supported by spreadsheet analysis of a typical U.S. real estate investment project in 1990.

9 Financial institutions fund this subsidized rate by paying zero or very low rates on demand deposits and special savings accounts.

Second, in 1982 Sweden had a number of saving incentives, such as a 30 percent dividend tax credit and tax concessions for funds invested in special bank accounts and share funds, that lowered effective tax rates for households and caused those on dividends and interest to differ (see Appendix B for details). We take the tax rate on real estate investors to be an average of the average effective marginal tax individuals paid on dividends and interest.

The weight (n in equation 5) given to the tax rate on dividends in the computation of the personal tax rate on corporate equity is set equal to 0.3 for all countries. In the U.S., the depreciable basis was reduced by half of the equipment investment tax credit (B = 0.5); the Australian credit did not reduce the basis.

We assume a constant 0.03 risk premium across assets and countries to make the calculations comparable. (If different risk premiums were assumed, we would then need to compute risk-adjusted net user costs of capital for our comparison purposes.) For similar reasons, we assume a constant b = 0.5 across assets and countries, except for owner-occupied housing in Australia (because mortgage interest is not tax deductible) and all housing in Sweden (where debt ratios are very high because borrowing is heavily subsidized).

The interest rate and expected inflation rate values are based on actual interest rates on five-year Treasury securities and reasonable estimates of expected inflation. The real pre-tax interest rate is constant in Australia and declines in both Sweden and the United States. The real after-tax interest rate (r) falls in Australia and rises in Sweden and the U.S. The decline occurred in Australia because of the increase in tax rates on interest and non-corporate business income; the increases in Sweden and the U.S. resulted from declines in tax

rates (and the level of inflation).

Table 3

Tax Rates for Households at Different Income Levels

	1980s	1990	Change
Australia			
(thousands, 1985 dollars)			
5-11	.267	.218	-.049
14-19	.30	.398	.098
20-23	.46	.398	-.072
24-28	.46	.478	.018
36 plus	.60	.483	-.117
Sweden			
(thousands, 1990 Skr)			
35	.31	.31	—
70	.37	.23	-.14
100	.50	.34	-.16
150	.63	.34	-.29
200	.80	.51/.31*	-.29/-.49*
United States			
(thousands, 1986 dollars)			
13- 25	.166	.176	.010
25- 30	.189	.180	-.009
30- 50	.251	.184	-.067
50-100	.364	.316	-.048
100-200	.455	.370	-.085

* The first number is the rate at which income is taxed; the second is the rate at which interest expense can be deducted.

Tax rates for households (individuals) with different incomes both before and after the tax reforms are shown in Table 3. The median incomes for the three countries are roughly $15,000 for Australian individuals, 100,000 Skr for

Swedish individuals, and $28,000 for American households. As can be seen, tax rates were cut sharply in Sweden and modestly in the U.S. Australian tax rates increased slightly on average.

Table 4
User Costs for the United States

	1982	1990	Change
Corporate Investments			
Equipment	.0671	.0850	.0179
Structures	.0853	.0948	.0095
Non-corporate Investments			
Commercial	.0586	.0696	.0110
Residential	.0586	.0703	.0117
Owner-Occupied Housing by Income Class (thousands, 1986 dollars)			
0	.0861	.0697	-.0164
13 to 25	.0641	.0557	-.0084
25 to 30	.0611	.0554	-.0057
30 to 50	.0528	.0551	.0023
50 to 100	.0379	.0446	.0067
100 to 200	.0258	.0403	.0145

United States Results

Table 4 reports investment hurdle rates for the United States. The hurdle rate for corporate structures exceeded that on non-corporate structures by roughly 2.7 percentage points in the early 1980s. Most (1.7 points) was due to the additional taxation of corporate income at the personal level ($\tau_e = 0.1254$).

The corporate penalty fell slightly as a result of the 1986 Tax Act, which removed the value of trading non-corporate structures by both increasing the capital gains tax rate and reducing tax depreciation deductions

The investment tax credit for corporate equipment offset much of the corporate penalty in 1982. Elimination of the credit in 1986 raised the equipment hurdle rate relative to that on structures, but the more valuable equipment tax depreciation schedule, absolutely as well as relative to the now less attractive schedule for structures, leaves the equipment hurdle rate a percentage point below that on industrial structures, but 1.5 percentage points above that on non-corporate structures. There is likely little change overall in the efficiency of the allocation of the business capital stock.

The generally higher hurdle rates in 1990 *vis-à-vis* 1982 are entirely due to the assumed increase in the real after-tax interest rate (r). With the nominal debt rate lowered from 0.07 to 0.0575, r is the same for corporate investments in 1990 as in 1982, and the hurdle rate for corporate structures is actually a half point less. With the same 0.0575 nominal debt rate, the r and hurdle rate for non-corporate structures are unchanged.

Hurdle rates for housing owned by households at different income levels are shown at the bottom of Table 4. They decline between 1982 and 1990 for lower income owners because their r's fall, while they rise for high income owners. The latter receive a double-whammy. First, their r rises, holding their tax rate constant: $(1 - .455).07 - .04 > (1 - .455).13 - .08$. Second, their tax rate falls from 0.455 to 0.37. The reduction in the spread between the user costs of lower income owners and higher income owners, from 6 to 3

percentage points, indicates incentives for a far more efficient allocation of the owner-occupied housing stock.

What about residential versus non-residential capital? In 1982, the tax system was biased against corporate investments and probably about neutral between owner and rental housing. Owner housing was favoured over rental for households with income above around $30,000 and disfavoured for those with lower incomes. In 1990, we see a strong bias in favour of owner-occupied housing.[10] Overall, one might expect modest efficiency gains owing to the more efficient allocation within the owner-occupied housing stock.

Australian Results

Table 5 reports investment hurdle rates for Australia. The pattern in 1985 is analogous to that in the U.S. in 1982 except that the rate for residential rental was higher because no tax depreciation was allowed in Australia. The general similarity in U.S. and Australian hurdle rates is not surprising given that Australia also had double taxation of corporate dividends and an investment tax credit for equipment only. The hurdle rate for equipment is virtually identical to that in the U.S., but those for corporate and non-corporate structures are higher. Structures were more penalized in Australia because of lesser tax depreciation: 25-year SL (none for rental) versus 15-year accelerated for non-residential.

Like the U.S., Australia removed the investment tax credit and lengthened tax

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10 This statement should not be misinterpreted. Hendershott and Slemrod (1983) emphasize that the tax rate relevant to computing owner-occupied housing user costs in the U.S. differs depending on whether one is considering the tenure-choice or quantity-demanded decision. Hendershott, Follain and Ling (1987) indicate that the tenure-choice tax rates declined far more in response to the 1986 Tax Act that did the quantity-demanded tax rates shown in Table 3. Thus the tenure-choice user costs rose by more than did the quantity-demand user costs.

depreciation lives, which tended to raise corporate hurdle rates. On the other hand, the increased tax rate on alternative investments and removal of the double taxation of corporate dividends tended to lower corporate hurdle rates. The net result was a 2.0 percentage point decline in the structures hurdle rate but a 1.4 percentage point increase in the equipment hurdle rate (owing to the loss of the investment allowance).

Table 5

User Costs for Australia

	1984-85			1990-91			Change	
Corporate Investments								
Equipment	.0670			.0806			.0136	
Structures	.0977			.0780			-.0197	
Non-corporate Investments								
Commercial	.0632			.0545			-.0087	
Residential	.0745			.0548			-.0197	
Owner-Occupied Housing								
by Income Class	Debt Ratio			Debt Ratio			Debt Ratio	
(thousands, 1985 dollars)	1.0	0.5	0.0	1.0	0.5	0.0	0.5	0.0
0	.0761	.0831	.0901	.0761	.0831	.0901	-	-
5-11	.0761	.0669	.0577	.0761	.0699	.0637	.0030	.0060
14-19	.0761	.0649	.0537	.0761	.0590	.0418	-.0059	-.0119
20-23	.0761	.0552	.0342	.0761	.0590	.0418	.0038	.0076
24-28	.0761	.0552	.0342	.0761	.0541	.0321	-.0011	-.0021
36 plus	.0761	.0495	.0172	.0761	.0538	.0315	.0043	.0143

Non-corporate hurdle rates also moved differently than in the U.S., decreasing

rather than increasing. The key here is that the tax rates for both rental income and interest deductions rose from 0.3 to 0.4, whereas in the U.S. they declined. In a world with no tax depreciation and no conversion of regular income to capital gains, the increase in these two tax rates would be a wash. However, the higher tax rate on rental income makes both tax depreciation and the conversion of regular income to capital gains relatively more valuable. Thus, the hurdle rate for commercial non-corporate structures falls by a percentage point. That for residential structures declines by two points because these structures have more generous tax depreciation allowances in 1990, not less generous.

Because home mortgage interest is not tax deductible in Australia, the user cost for owner-occupied housing depends negatively on the amount of debt. This illustrates an often misunderstood point: the tax advantage for owner-occupied housing stems from the non-taxation of implicit rental income, not the home mortgage interest deduction. The home mortgage deduction simply ensures that the tax advantage is received even when housing is debt financed. On the other hand, the assumed 0.015 subsidy for home mortgage interest makes debt more attractive for those not paying taxes.

Table 5 lists user costs for 100 percent, 50 percent, and zero debt finance. For individuals who totally debt finance (or who are in the zero tax bracket), the user cost is 0.0761 in both 1984-85 and 1990-91. For taxpaying individuals, the user cost declines with both income and the use of equity finance. Thus there are two sources of inefficiency in the allocation of the owner housing stock in Australia.

In 1984-85, the user cost varied between 0.0901 (zero tax rate and no debt)

and 0.0172 (high income and no debt). The average cost across households was probably in the neighbourhood of 0.055 (the average Australian debt ratio is about an eighth). This was significantly less than the user cost of business capital generally. The tax law changes probably did not alter the user cost for owner-occupied housing, on average. Because the user cost for other capital certainly fell, on average, owner occupied housing is now less favoured than before *vis-à-vis* other investments.

The most peculiar aspect of the Australian law, though, is how widely the cost of capital for owner-occupied housing is expected to vary over an individual's lifetime. For individuals in their twenties, when most are earning less than average income and would need to heavily lever a house purchase, the user cost is about 0.075. In contrast, when this same individual is in his fifties, with above average income and a paid off mortgage, the cost is only 0.042. Continuing to discourage individuals from owning early in their adult lives and to encourage them later does not seem reasonable.

Swedish Results

Table 6 presents investment hurdle rates for Sweden. The rates in 1982 had the same general pattern as in the U.S., but all rates were lower, especially those for non-corporate investments. The extremely low non-corporate rates were due to the greater advantage in Sweden of converting regular income to capital gains. Higher inflation meant that a greater share of returns took the gains form, and a larger gap between the regular income tax rate and the gains rate (0.5 - 0.1 in Sweden versus 0.3 - 0.06 for the U.S.) increased the value of the conversion. The second, lower number for non-corporate residential reflects the subsidy for new construction; there is no 1991 subsidy at the low assumed real interest rate (but see Hendershott and Waller 1992, for further

discussion).

The general rise in Swedish user costs between the early 1980s and 1991 is due to removal of the investment tax credit, less generous tax depreciation for structures, and a small increase in the real after-tax financing rate. The sharper rise in non-corporate user costs results from the much reduced conversion of regular income to capital gains. The lower inflation rate reduced the share of returns in the gains form, and the drop in the differential between the regular income and capital gains tax rates from 0.4 to 0.15, owing to movements in both regular and gains rates, reduced the value of conversion.

Table 6

User Costs for Sweden

	1982	1991	Change
Corporate Investments			
Equipment	.0515	.0818	.0303
Structures	.0764	.0906	.0142
Non-corporate Investments			
Commercial	.0172	.0634	.0462
Residential*	.0207/ .0127	.0650	.0443/.0523
Owner-Occupied Housing by Income Class* (thousands of 1990 Skr)			
0	.1048/ .0823	.0704	-.0344/-.0119
35	.0597/ .0507	.0386	-.0211/-.0121
70	.0510/ .0439	.0468	-.0042/ .0029
100	.0321/ .0285	.0353	-.0032/ .0068
150	.0132/ .0120	.0355	-.0223/ .0235
200	-.0115/-.0111	.0283	-.0295/ .0291

*The second numbers in 1982 reflect the value of the interest rate subsidy.

The hurdle rates for owner-occupied housing in 1982 (subsidized and especially unsubsidized) were relatively high for individuals with below median incomes. For high income individuals, however, the user cost was negative. This wide disparity was due to the wide range of income tax rates, and thus real after-tax interest rates, faced by different individuals. The subsequent sharp cut in tax rates substantially narrowed the range of user costs (adjusted for the 1982 subsidies), by about 4 percentage points, thereby increasing the efficiency of the allocation of the owner-occupied housing stock. The user cost of the highest income group is sensitive to the level of debt financing because they face a 51 percent tax rate, but can only deduct interest at the 31 percent rate. With no leverage, the user cost is only 0.0180; with 100 percent leverage, it is 0.0386.

Cross Country Comparison

Last, we compare user costs across countries, beginning with those on corporate investments. In the early 1980s, Swedish costs were about a percentage point below those in the U.S., while the cost for structures in Australia was over another percentage point higher. All costs were higher by the early 1990s, except for structures in Australia, and Swedish costs had risen the most. In 1990, U.S. costs exceeded Swedish costs by less than half a point. Moreover, Australian costs were the least, being the same as Swedish costs for equipment but 1.25 percentage points less for structures.

The same pattern holds for non-corporate investments: Swedish costs are a half percentage point less than the U.S. costs, and Australian costs are another point lower. User costs for owner-occupied housing are more difficult to compare, owing to the non-deductibility of home mortgage interest in Australia. Swedish costs are about a point lower than U.S. costs, and

Australian costs are even higher, except for high-income, debt-free Australians.

IV. Conclusions

Australia, Sweden and the United States all passed major tax legislation in the middle and late 1980s. Comparing the three countries, Australia went from the country with the highest corporate costs of capital to that with the lowest, reducing its costs for equipment and structures, relative to the other two countries, by 0.25 to 1.5 and 3 to 3.5 percentage points, respectively. Sweden, in contrast, went from the country with the lowest costs of capital to that with nearly the highest by raising its costs for equipment and structures, respectively, by 1.5 and 3 percentage points. Corporate costs in the United States increased by only about two-thirds as much. From an international competitiveness perspective, Australia gained and Sweden lost.

By sharply reducing marginal income tax rates, especially at higher income levels, Sweden and the United States greatly narrowed the range of user costs for owner-occupied housing across the income spectrum, providing incentives for a more efficient allocation of the existing housing stock. In contrast, incentives for substantial inefficiencies in the allocation of Australia's owner-occupied housing stock remain, owing to both a quite progressive personal tax rate schedule and the non-deductibility of home mortgage interest. The United States lowered owner-occupied housing costs of capital even further relative to those of business capital, reducing the overall efficiency of the total capital stock, while Australia did the reverse.

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APPENDIX A

Derivation of Tax Rates for Australia

The tax rate applied to dividend income, τ_{div}, is based on a number of assumptions. It is assumed that individuals, overseas investors, and domestic institutional investors owned 15, 35, and 50 percent of shares, respectively, in 1984-85 and 15, 25, and 60 percent in 1990-91 (these percentages are based on data obtained from the Australian Stock Exchange). Many of the domestic institutions are nomineed companies representing other investors. Because the composition of this group of shareholders is unknown, we assumed that individuals (including non-corporate businesses), corporations, and superannuation funds hold one-third each. The values shown are the appropriate averages. The imputation system for 1990-91 results in a negative value for τ_{div} because individuals on average probably paid less than 0.01 in additional tax on franked dividends (the difference between average taxpayer's marginal rate and the corporate rate), superannuation funds received a 0.24 credit that could be applied against other income, and corporations neither paid additional tax nor received a credit. It was also assumed that half of the dividends received by overseas investors were franked and therefore the investors incurred no additional liability and half were unfranked and taxed at the normal rate (0.15) for investors from tax treaty countries.

For 1984-85, the tax rate on interest, τ_i, is the same as τ_{div} for corporations and the same as τ for non-corporate businesses. For 1990-91, τ_i is also the same as τ for non-corporate businesses. For corporations, it is calculated in the same manner as τ_{div}, but without the 0.39 adjustment for imputation.

The property tax variable, w, captures the effects of both State stamp duties on conveyancing and local property rates as they apply to buildings. The stamp

duties had weighted averages of about 2.7 percent in 1984-85 and 3.2 percent in 1990-91. Home buyers, particularly first home buyers, received various concessions in both years. To take into account the effects of the stamp duties, they were converted to equivalent perpetual annual rates and added to the local property rates, which were calculated as follows: In New South Wales and Queensland and the Northern and Australian Capital Territories, only land is taxed by municipal governments. In the States of Victoria, South Australia, and Western Australia, some local governments tax only land and some tax improvements as well. All local governments in Tasmania tax both land and improvements. Weighted average tax rates on improvements were calculated for Victoria, South Australia, Western Australia, and Tasmania, using a rate of zero for municipalities taxing land only. These averages were then weighted over all the States, using land tax revenue as a rough proxy for the amount of land value in each State. The weighted averages were 0.32 percent in 1984-85 and 0.25 percent in 1990-91. The decline was due primarily to an increasing concentration of property values in New South Wales and Queensland, neither of which taxes improvements.

Additional details may be found in Bourassa and Hendershott (1992).

APPENDIX B

Derivation of Tax Rates for Sweden

To obtain estimates of average effective marginal tax rates of equity investors, we need the distribution of holdings of each asset class across types of investors (individuals, insurance companies, and pensions) and the effective marginal tax rates for each investor type. The underlying data for 1982 are based on Södersten and Lindberg (1984). The 1991 data come from Södersten (1991).

We begin with corporate stock. The assumed distributions for the two years are:

	Individuals	Insurance	Pensions
1982	.6	.1	.3
1991	.5	.1	.4

The 1982 data are assumed to be the same as the 1979 data given in Södersten and Lindberg (Table 4.18), and the 1991 data are a continuation of the shift observed between 1965 and 1979.

The weighted average statutory marginal tax rates for 1982 are 0.64 for dividends and 0.492 for interest (Table 4.4). A dividend tax credit and tax saving schemes lower the effective rates to 0.495 for dividends and 0.44 for interest (p. 64). This interest tax rate is not that desired. This is the average for all investors, not for investors in corporate equity. The statutory rate on interest for equity investors is that on dividends, 0.64. To convert this to an effective rate, we multiply it by 0.44/0.492, the ratio of the effective and statutory rates for the average interest recipient, getting 0.563. For 1991, we use 0.3 as the effective marginal rate for both dividends and interest.

The assumed average effective tax rates on dividends and interest for the three classes of corporate equity investors for the two years are:

		Individuals	Insurance	Pensions	Weighted Average
1982	Dividends	.495	.19	.00	.316
	Interest	.563	.28	.00	.366
1991	Both	.30	.23	.036	.187

The insurance rates in 1982 are from p. 68. The insurance and pension rates in 1991 are from Table 2 of the appendix.

We assume that all non-corporate investments are made by individuals. We use 0.3 for this tax rate in 1991. For 1982, we use the average of the effective tax rates on interest for investors in dividends (0.563) and interest (0.44), or 0.5.

For the owner-occupied housing 1982 "property" tax rate, we use a base 0.013 rate for the tax on imputed rent (fraction of market value) plus a 0.010 penalty for having interest exceeding the imputed rent (Södersten, 1991, pp. 22-23). For 1991, we use half of the 0.10 quoted rate. Both the interest penalty and the halving of the quoted rate are based on our analyzing investment incentives for new construction. With new construction, properties will have substantial debt and thus relatively high interest. Under the new law, the property tax is waived for five years on new construction and then assessed at only a 0.75% rate thereafter.

For the business property tax rate, we use that given for rental property in 1991 for both years.

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